

Abstract

This project introduces an optimized design for an extractive distillation system for the production of anhydrous ethanol using Aspen Plus software. Addressing the increasing demand for alternative energy sources, particularly bioethanol, the project focuses on overcoming the challenges of ethanol-water azeotropic mixtures through the innovative use of glycerol as an entrainer. By simulating the distillation process, the project aims to design a system that can purify ethanol from near-isotropic purity to anhydrous purity, achieving a final product of 99.7% ethanol by mass from an input of 92% ethanol, with minimal energy use and waste generation. The design has achieved and surpassed the objective it originally set out to accomplish by showcasing a system that is energy-efficient, environmentally friendly, and resistant to fluctuations in process and environmental variables. This research contributes valuable insights into high-purity substance production through distillation processes, paving the way for further application in the industry and aligning with the objectives of green chemistry.